Getting the Bigger Picture: More Bytes for your Buck

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Session III, 12 August 2008
A British company that is pioneering a different approach…

“Changing the Economics of Space”

…by producing rapid-response, highly capable, yet low-cost small satellites built using advanced terrestrial technologies
Disaster Monitoring Constellation

- Constellation of 5 spacecraft built between 2002 and 2004
  - 32-m Ground Sampling Distance
  - Red Green and Near-infrared (Comp. to Landsat 2,3,4)
  - Wide 600+km swath
  - Daily Global Revisit
  - Unique International Cooperation
  - Supporting the International Charter for Space and Major Disasters
- Commercially successful as well!
UK-DMC-2 Mission

- **User:**
- **Ground Segment:** 5.5m S/X Bordon, UK
- **Launch:** Dnepr Dec. 2008
- **Orbit:** 680 km SSO, 10:30 LTAN
- **Flight Heritage on experiments**
- **Schedule:** 18 months
- **Applications:**
- **Cost SSTL Microsat-100:** $13-17 million (exc. launch)
UK-DMC-2 Specifications (1)

- **Imager Payload**
  - 22m GSD
  - Red, Green, Near Infrared
  - 8-bits and 10-bits digitisation
  - 600+ km swath

- **Orbit Average Power**
  - 48 W
  - Three GaAs/Ge panels
  - One deployable InGaP/InGaAs/Ge panel
  - Deployable Panel increases OAP by 60%
UK-DMC-2 Specifications (2)

- Downlink Data Rate
  - 20 Mbps and 80 Mbps X-Band

- Data Storage
  - 4 + 8 GByte RAM

- Experimental hardware to gain flight heritage
  - SGR-07 GPS Receiver
  - Fine Sun Sensors
  - Set of three COTS Heatpipes
Operational Modes (1)

- **Store and Forward Imaging**
  - Up to 1800 km along-track with 650 km swath
  - Over 6000 km with 185 km swath
  - Allows rapid coverage of large areas

- **Yearly Coverage of Amazon Basin**
  - 6 weeks with 3 s/c of current DMC
  - 10 days with UK-DMC-2
  - Comparison of UK-DMC-1 with UK-DMC-2

UK-DMC-1

UK-DMC-2
Operational Modes (2)

- **Near Real Time Imaging**
  - Full image downlinked within ground station pass
  - Image size adjustable, narrow and long or wide and short
  - Full access image up to ~4000 km using ~215km wide swath

- **“Broadcast” Downlink**
  - Downlinks to receive-only groundstations
  - Bit-Error-Rate $<10^{-9}$
  - Relatively high-spec groundstation needed for 80 Mbps reception ($G/T=31.59$ dB/K @ 5deg El.)
  - 20 Mbps downlink can be used to groundstations as small as 3 m ($G/T=25.8$dB/K @ 5deg El.)
Global Data Reception

- Near Real Time Broadcast Mode to Multiple Groundstations allows a very attractive commercial potential
- "Landsat style" data reception contracts to up to 14 groundstations per day
- Easy planning, no build-up of storage
Throughput Performance

- Up to 11 million km$^2$ of imagery per day (More than US Territory)
- 2 weeks to cover the equivalent of the Earth’s landmass
- Example daily coverage using 13 groundstations worldwide using store and forward and Near Real Time imaging and downlink
Next Generation Constellation

- Next Generation Constellation can be used for rapid, periodic, multi-season mapping of full continents
- 22-m imagery will be used as part of ESA’s Global Monitoring for Environment & Security Programme (GMES)
- With further SSTL advancements in on-board storage, power generation and downlink capability, daily coverage of the Earth’s landmass is possible within the next few years